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Lars ANGELIN

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For: A PAYMENT SYSTEM AND METHOD FOR USE IN AN ELECTRONIC COMMERCE SYSTEM

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Assistant Commissioner for Patents
Washington, DC 20231

SUBMISSION OF PRIORITY DOCUMENT

Sir:

It is respectfully requested that this application be given the benefit of the foreign filing date under the provisions of 35 U.S.C. §119 of the following, a certified copy of which is submitted herewith:

Application No.	Country of Origin	Filed
9904258-2	**Sweden**	**23 November 1999**

Respectfully submitted,

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PRV

PATENT- OCH REGISTRERINGSVERKET
Patentavdelningen

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Härmed intygas att bifogade kopior överensstämmer med de handlingar som ursprungligen ingivits till Patent- och registreringsverket i nedannämnda ansökan.

This is to certify that the annexed is a true copy of the documents as originally filed with the Patent- and Registration Office in connection with the following patent application.

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För Patent- och registreringsverket
For the Patent- and Registration Office

Therese Friberger

Therese Friberger

Avgift
Fee 170:-

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APPLICANT: **TELEFONAKTIEBOLAGET L M ERICSSON**
TITLE: **A PAYMENT SYSTEM AND METHOD FOR USE IN AN ELECTRONIC COMMERCE SYSTEM**

Field of the Invention

The present invention relates to a payment system and method for an electronic commerce system, and more particularly to a payment system and method utilising at least a customer agent and a merchant agent, at least an account manager associated with said agents for administration of customer accounts and merchant accounts, and at least a mediating trusted agent associated with said at least one account manager and merchant agent for checking transactions, for purchases made by a customer from a merchant.

Description of the Prior Art

Different kinds of electronic commerce systems and associated payment systems are provided. Some existing systems provide only handling of payments, i.e so called payment systems, some systems provide full transaction services, and other systems provide some transaction services together with payment services.

Transactions and payments in such electronic commerce systems are done over a communiction network such as the public switched telephone network, cellular phone systems, the Internet, or an intranet etc. Small payment transactions are denoted micro payments. The goods, such as documents, pictures, software, stock market information, etc., are purchased by a customer via a webbrowser from a merchant over the Internet.

Crucial for all existing micro payment schemes is a very low transaction cost, i.e the transaction cost must be at least a magnitude smaller than the price of the goods.

The low prices of the goods implies a lower expectation of the security level compared to "full" price systems.

Further, other requirements on micro payment systems is low price, fast and reliable transfer, and provide customer integrity.

For every transaction, money has to be transferred from a customer account to a merchant account. Micro payment may be considered as one transaction per merchant site while as a plurality of transactions in other cases. The current business model for micro payments is still not well understood and different solutions aim for different models.

There are two basic consepts and a number of different solutions for each concept on the market. On the one hand DigiCash, CyberCoin and Millicent are well known digital cash solutions representing the first concept and on the other hand IBM's MiniPay is a account based solution, wherein real money is transferred between different accounts, representing the second concept.

The MiniPay is a light weight system and probably quite cheap regarding operating costs and user friendly.

A general description of a prior art account based system is described with referens to FIG 1.

According to a generic payment system as shown in FIG 1, a merchant 100 displays the goods for sale, e.g on a web-page, at step 0. A customer 101 orders goods at step 1. At step 2, the customer 101 sends a payment order to its account manager 102. The payment is transferred to a value acquirer 103 at step 3. The merchant 100 is notified of the payment completion by the value acquirer 102 at step 4 and the goods are finally delivered.

A micro payment system such as the IBM MiniPay system includes a plurality of necessary features in order to operate properly. When a purchasable item is presented on a customers browser, the Minipay provides desired click and

pay features for the order and payment of the goods. Further, an easy way for establishment of the link between the goods and the payment system, and the use of the system from the customer's as well as the merchant's point of view has to be provided. The usefulness of the payment system increases if it is adaptable to several accounting systems like Teleco's billing systems and banking accounts. It must be possible to do business in multi-operator environment. The system must be scalable, i.e adaptable for a few users as well as for millions of users with costs growing not more than linearly. For the purpose of distribution the system has to run on standard hardware, such as PCs and workstations. The value of the goods for sale in a micro payment environment is quite low and, consequently, the security measures should be in haremony with these values. Micro payment systems has to provide limited information volume and processing overheads for the transactions. Among the required processing tasks are costumer authentication, authorization, and currency exchange rate calculations. Most of the above mentioned features are solved by the MiniPay system.

However, a problem with the MiniPay system and other prior art payment systems is less good solutions to the problem of interoperator transactions, and complex clearing procedures of transactions within an operator and between operators. Another problem is that prior art payment systems only support a single or a pair of currencies and it is not possible to add new currencies.

A main problem in digital cash systems and in some account based systems is double spending, which occures when costumers are involved in several transactions simultaneously. Customer integrity is a furhter problem in electronic commerce systems, i.e merchants can utilise customer consumption patterns in undesired ways. Authentication, authorisation of the customer and the

handling of encryption keys are important features in a payment system.

Summary of the Invention

It is an object of the present invention to provide an improved electronic payment system for use in an electronic commerce system and a method thereof, which reduces the transfer and processing costs for each purchase by a customer from a merchant in the commerce system.

Another object of the present invention is to provide a payment system not disclosing the customer's identity during a trading session.

It is still another object of the present invention to provide secure transactions between a customer and a merchant in order to protect the customer's accounts and its account manager from abuse.

It is a further object of the present invention to prevent double spending of the customer.

It is yet another object of the invention to provide and reduce the authentication procedure to a minimum.

It is still a further object of the present invention to provide a payment system adaptable to several accounting systems.

A further object of the present invention is to enable interoperator transactions.

Still another object of the present invention is to provide a scalable payment system.

Yet another object of the present invention is to support a plurality of currencies.

These objects are accomplished by a payment system and method according to claim 1 and 12, respectively.

Brief Description of the Drawings

In order to explain the invention in more detail and the advantages and features of the invention a preferred embodiment will be described in detail below, reference being made to the accompanying drawings, in which

FIG 1 is a block diagram showing a network configuration of a prior art electronic payment system for use in electronic commerce;

FIG 2 is a block diagram showing a network configuration of an electronic payment system according to the invention for use in electronic commerce, illustrating the initiation and continuation of a trading session; and

FIG 3 is a block diagram showing a network configuration of an electronic payment system according to the invention for use in electronic commerce, illustrating the concusion of the trading session;

Detailed Description of the Invention

With reference to FIG 2 and 3, a payment system for use in an electronic commerce system for reducing the transfer and processing costs for each purchase made by a customer from a merchant, comprises at least a merchant agent 200, such as a server or computer system operated by a merchant, a customer agent 201, such as a PC or workstation operated by a customer, at least an account manager 202 provided by an operator associated with said agents for administration of customer accounts and merchant accounts, and at least a mediating trusted agent or a so called value acquirer 203 provided by the operator or another operator associated with the at least one account manager 202 and merchant agent 200 for checking transactions during a trading session.

The customer agent(s) 201 and merchant agent(s) 200, the account manager(s) 202, and the mediating trusted agent(s) 203 are interconnected by for example an

electronic communication network, such as the Internet, an intranet, a public switched telephone network, and/or a mobile telephone network, an optical network, or a combination thereof, or another kind of communication network.

The main function of the account manager 202 is to administer the customer accounts and trading records, and to create and forward billing records to external billing systems, such as banks, telecommunication operators, credit card firms etc. A merchant or the merchant agent are associated like customers to the account manager 202, the difference is in the relation to the mediating trusted agent 203.

The mediating trusted agent or value aquirer 203 is a part of the micro payment system of the merchant's operator and its function is to check the transaction records when trading sessions are terminated and to delicer the transaction records to the appropriate account managers of the customer and merchant, respectively.

A relation between a customer 201 and an account manager 202 when the customer is logged-on to the account manager is denoted a session. Each session is given an identity generated by the customer 201 according to the followin illustrative pseudo code expression:

SessionIdentity=AccountManagerIdentity.Sequencanumber1

The SessionIdentity is generated by a customer agent 201 when it is logged-in to the account manager 202. The SessionIdentity is valid through the complete session.

A relation between a customer agent 201 and a merchant agent 200 when the customer orders goods is denoted transaction. Each transaction is given an identity when it sis generated by the customer according to the following pseudo experssion.

TransactionIdentity=AccountManagerIdentity.Sequencenumber2

The TransactionIdentity is generated by the customer agent 201 when the purchase order for a transaction is placed. Further, the TransactionIdentity is valid through the complete transaction.

A method of payment of goods in an electronic commerce system according to the invention is divided in to parts: an initiation phase illustrated in FIG 2, including steps regarding the initiation and continuation of a trading session; and a conclusion phase illustrated in FIG 3, including steps regarding the conclusion of a trading session.

Hence, in the following description, the micro payment system is only partly disclosed. Some well-known features such as the initial contacts between a customer and a merchant and the resgistrations and other system entities are not described in detail so as not to make the present invention unclear.

All involved parties are given an asymetric key pair at initiation and algorithms like RSA or DSA are likely to be used and all communication except between the customer and the merchant is carried out on secure channels like SSL or IPSec.

In the initiation phase, a normal GET URL message is used to download a web page and a normal response to the GET URL is performed at step 0, i.e a web page with prices and information associated for proceeding with the transaction. The merchant agent 200 receives an order of goods/service from the customer agent 201. The customer account manager 202 receives an initiation message sent from the customer agent 201, wherein the message includes data for registration of the customer agent 201, and order information with the size of the purchase. The initiation

message further comprises the amount of the deposit, a transaction identity, the identity of the merchant and the identity of the merchant's operator for locating a proper mediating trusted agent 203.

Fruther, the customer account manager 202 provides the customer agent 201 with account data during a trading session being established between the customer agent 201 and the merchant agent 200 over the network. The customer account manager 202 amends and forwards the initiation message to the mediating trusted agent 203 for registration of the customer, and delivering of a deposit. The amended initiation message comprises the deposit in the customer currency, the customer currency, a customer identifier, the transaction identity, and the identity of the merchant.

The mediating trusted agent 203 sends an information message including the deposit to the merchant agent 200. The information message comprises the deposit in the currency of the merchant, a trading session identity, and the customer identifier. The trading session is now ready to start.

After the mediating trusted agent 203 has sent an information message, the merchant acknowledgies the customer and the associated deposit to the mediating trusted agent 203.

The mediating trusted agent 203 acknowledges the customer and the associated deposit to the customer account manager 202.

The acknowledging including the current exchange rate and that the customer account manager 202 forwarding the exchange rate to the customer agent 201.

When the customer account manager 202 amends and forwards the initiation message to the mediating trusted agent 203 the customer is also authenticated.

When the value of at least one purchase amounts to the value of the deposit, a clearing procedure is initiated

by the perchant 200. If the deposit is consumed and a subsequent purchase attempt is made it will be treated as an initial purchase attempt and a new trading session is initiated. However, a plurality of transactions can be executed within the limit of a single deposit.

Additionally, the trading session can be stopped by instructions from the customer agent 201 or the merchant agent 202 or after a timer expiry.

Thus, in order to stop or terminate the trading session the merchant agent 200 receives a trading session terminate message sent by the customer agent 201.

During the conclusion phase the customer account manager 202 receives a customer transaction record sent by the customer agent 201, the customer account manager 202 sends the customer transaction record to the mediating trusted agent 203 and the merchant agent 200 sends a merchant transaction record to the mediating trusted agent 203.

Further, the mediating trusted agent 203 compares and evaluates the transaction records, resulting in clearing information. The mediating trusted agent 203 sends the clearing information to the customer account manager 202 and a merchant account manager 204, respectively.

Finally, the customer account manager 202 and a merchant account manager 204, respectively, send the clearing information to the customer agent 201 and the merchant agent 200. Based on the clearing information, the transaction records are processed to a withdrawal record and a deposit record, respectively, which are stored. The withdrawal record is sent to a customer billing system 205 and the deposit record is sent to a merchant billing system 206.

It is apparent that the trading session comprises a good number of single purchases, thereby reducing the transfer and processing costs for each purchase as most of

the required transfer and processing are performed at one instant for a large number of purchases. This is especially important for the costly chores, such as authenticatoin/authorization and secure money transfer but also for the currency exchange rate converion.

The customer identity is not disclosed by the payment system, not even to the trusted mediating agent. The merchant will only have access to a temporary customer identity and the customer public key, which is not traceable via the payment system. The merchant must of course know the IP address of the customer but one may assume that the customer has a dynamic IP address and it is not traceable without some effort.

On the merchant side, both the merchant and the merchant's operator have secured their payment from the customer's side. In order to protect the customers account and the account manager from abuse, secure channels like SSL or IPSec are used with sufficient strength in the encryption algorithms and the associated keys. The same applies between the merchant and the mediating trusted agent.

Double spending is impossible since the account manager does not hand out deposits beyond its own credit limit for the customer.

The PKI(Private Key Infrastructure) is reduced to a minimum, because a customer/merchant needs only to know the public keys of its clients. The difficult part is the operators knowledge of other operators publik key. Other knowledge of public keys is only temporary.

The payment system according to the invention is adaptable to several account systems, because of an API in the account manager.

Further, the system assumes a multioperator environment, it is scalable, the number of supported

currencies is only limited by the operators willingness to sign agreements with other operators.

Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure, it is to be understood that the disclosure is illustrative only, and changes may be made in detail within the principles of the invention indicated by the broad general meaning of the claims.

For example, in another embodiment of the invention the customer agent is a mobile phone communicating with a merchant over a mobile telephone network and/or a public switched network.

CLAIMS

1. A method of payment of goods in an electronic commerce system, utilising at least a customer agent (201) and a merchant agent (200), at least an account manager (202) associated with said agents for administration of customer accounts and merchant accounts, and at least a mediating trusted agent (203) associated with said at least one account manager (202) and merchant agent (200) for checking transactions, for purchases made by a customer from a merchant,

said at least one customer agent (201) and merchant agent (200), said at least one account manager (202), and said at least one mediating trusted agent (203) being interconnectable by a communication network,

comprising the step of:

said merchant agent (200) receiving an order of goods/service from said customer agent (201);

characterised by the further steps of:

a customer account manager (202) receiving an initiation message sent from said customer agent (201), said message including data for registration of said customer agent (201), and order information; and providing said customer agent (201) with account data during a trading session being established between said customer agent (201) and said merchant agent (200) over the network;

said customer account manager (202) amending and forwarding said initiation message to said mediating trusted agent (203) for registration of said customer, and delivering of a deposit;

said mediating trusted agent (203) sending an information message including said deposit to said merchant agent (200); and

when the value of at least one purchase amounts to the value of the deposit, or by instructions from said customer agent (201) or merchant agent, the trading session is stopped.

2. A method according to claim 1, **characterised** in that a plurality of transactions is executed within limit of said deposit.

3. A method according to claim 1 or 2, **characterised** in that said initiation message further comprises the amount of the deposit, a transaction identity, the identity of the merchant and the identity of the merchant's operator for locating a proper mediating trusted agent (203).

4. A method according to claim 3, **characterised** in that said amended initiation message comprises the deposit in the customer currency, the customer currency, a customer identifier, said transaction identity, and the identity of the merchant.

5. A method according to claim 4, **characterised** in that said information message comprises the deposit in the currency of the merchant, a trading session identity, and said customer identifier.

6. A method according to any of the preceding claims, **characterised** in that, after the step of said mediating trusted agent (203) sending an information message, it comprises the further step of:

said merchant acknowledging the customer and the associated deposit to said mediating trusted agent (203).

7. A method according to claim 6, **characterised** by the further step of:

said mediating trusted agent (203) acknowledging the customer and the associated deposit to said customer account manager (202).

8. A method according to claim 7, **characterised** in that said acknowledging including the current exchange rate and that said customer account manager (202) forwarding said exchange rate to the customer agent (201).

9. A method according to any of the preceding claims, **characterised** in that the step of said customer account manager (202) amending and forwarding said initiation message to said mediating trusted agent (203) further comprises the substep of:

authenticating the customer.

10. A method according to any of the preceding claims, **characterised** in that the step of stopping the trading session further comprises the substep of:

said merchant agent (200) receiving a trading session terminate message sent by said customer agent (201).

11. A method according to claim 10, **characterised** by the further steps of:

said customer account manager (202) receiving a customer transaction record sent by said customer agent (201);

said customer account manager (202) sending said customer transaction record to said mediating trusted agent (203);

said merchant agent (200) sending a merchant transaction record to the mediating trusted agent (203);

said mediating trusted agent (203) comparing and evaluating said transaction records, resulting in clearing information;

said mediating trusted agent (203) sending said clearing information to said customer account manager (202) and a merchant account manager, respectively; and

said customer account manager (202) and a merchant account manager, respectively, sending said clearing information to said customer and said merchant; based on said clearing information, processing said transaction records to a withdrawal record and a deposit record, respectively; storing the transaction records; and sending said withdrawal record to a customer billing system and said deposit record to a merchant billing system.

12. A payment system for use in an electronic commerce system, comprising at least a customer agent (201) and a merchant agent (200), at least an account manager (202) associated with said agents for administration of customer accounts and merchant accounts, and at least a mediating trusted agent (203) associated with said at least one account manager (202) and merchant agent (200) for checking transactions, for purchases made by a customer from a merchant,

said at least one customer agent (201) and merchant agent (200), said at least one account manager (202), and said at least one mediating trusted agent (203) being interconnectable by a communication network,

characterised in that

said merchant agent (200) is adapted to receive an order of goods/service from said customer agent (201),

said customer account manager (202) is adapted to receive an initiation message sent from said customer agent (201), said message including data for registration of said customer agent (201), and order information; and to provide said customer agent (201) with account data during a trading session being established between said customer agent (201) and said merchant agent (200) over the network;

said customer account manager (202) is adapted to amend and forward said initiation message to said mediating

trusted agent (203) for registration of said customer, and to deliver said deposit;

said mediating trusted agent (203) is adapted to send an information message including said deposit to said merchant agent (200); and

said merchant agent (200) and/or customer agent (201) are adapted to stop the trading session by their on initiative or when the value of at least one purchase amounts to the value of the deposit.

13. A payment system according to claim 12, **characterised** in that said account manager (202) and said mediating trusted agent (203) are separate modules.

14. A payment system according to claim 12 or 13, **characterised** in that a plurality of transactions is executable within the limit of said deposit.

15. A payment system according to any of the claims 12-14, **characterised** in that said initiation message further comprises the amount of the deposit, a transaction identity, the identity of the merchant and the identity of the merchant's operator for locating a proper mediating trusted agent (203).

16. A payment system according to claim 15, **characterised** in that said amended initiation message comprises the deposit in the customer currency, the customer currency, a customer identifier, said transaction identity, and the identity of the merchant.

17. A payment system according to claim 16, **characterised** in that said information message comprises the deposit in the currency of the merchant, a trading session identity, and said customer identifier.

18. A payment system according to any of the claims 12-17, **characterised** in that said merchant agent (200) is adapted to acknowledge the customer and the associated deposit to said mediating trusted agent (203).

19. A payment system according to claim 18, **characterised** in that said mediating trusted agent (203) is adapted to acknowledge the customer and the associated deposit to said customer account manager (202).

20. A payment system according to claim 19, **characterised** in that said acknowledging including the current exchange rate and that said customer account manager (202) is adapted to forward said exchange rate to the customer agent (201).

21. A payment system according to any of the claims 12-20, **characterised** in that said mediating trusted agent (203) is adapted to authenticate the customer after receiving said amended initiation message from said customer account manager (202).

22. A payment system according to any of the claims 12-21, **characterised** in that said merchant agent (200) is adapted to receive a trading session terminate message sent by said customer agent (201).

23. A payment system according to any of the preceding claims, **characterised** in that said customer account manager (202) is adapted to receive a customer transaction record sent by said customer agent (201);

said customer account manager (202) is adapted to send said customer transaction record to said mediating trusted agent (203);

said merchant is adapted to send a merchant transaction record to the mediating trusted agent (203);

said mediating trusted agent (203) is adapted to compare and evaluating said customer and merchant transaction records and generate clearing information;

said mediating trusted agent (203) is adapted to send said clearing information to said customer account manager (202) and a merchant account manager connected to said mediating trusted agent (203) via said network, respectively;

said customer account manager (202) and a merchant account manager are adapted to send said clearing information to said customer and said merchant, respectively; based on said clearing information, process said transaction records to a withdrawal record and a deposit record, respectively; store the transaction records; and sending said withdrawal record to a customer billing system and said deposit record to a merchant billing system.

ABSTRACT

A method and system of payment of goods in an electronic commerce system, which reduces the transfer and processing costs for each purchase made by a customer from a merchant, utilising at least a customer agent (201) and a merchant agent (200), at least an account manager (202) associated with the agents for administration of customer accounts and merchant accounts, and at least a mediating trusted agent (203) associated with the at least one account manager (202) and merchant agent (200) for checking transactions during a trading session. The at least one customer agent (201) and merchant agent (200), the at least one account manager (202), and the at least one mediating trusted agent (203) being interconnected by an electronic communication network.

To be published with FIG 2.

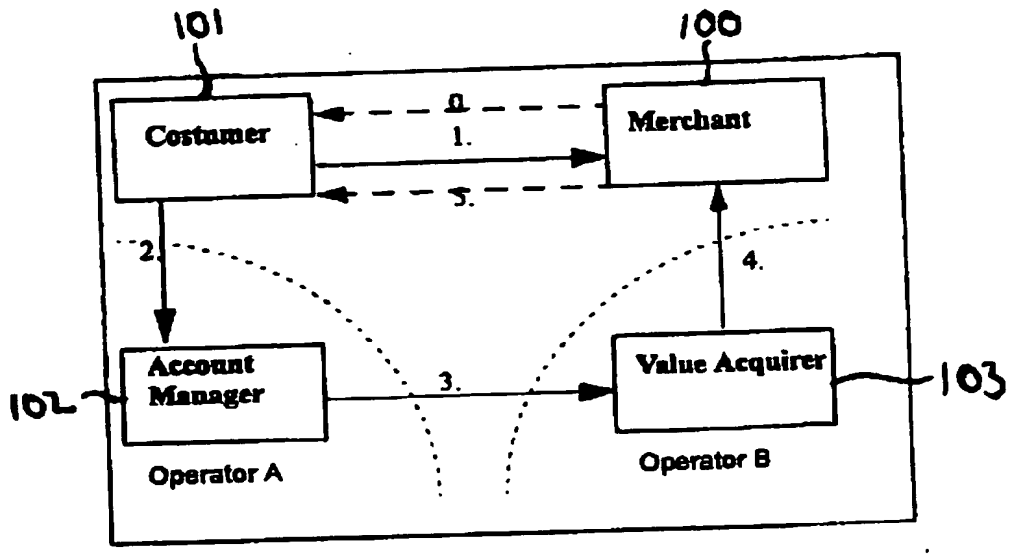
101
100
Costumer
Merchant
0
1.
5.
2.
4.
Account Manager
3.
Value Acquirer
102
103
Operator A
Operator B

FIG 1

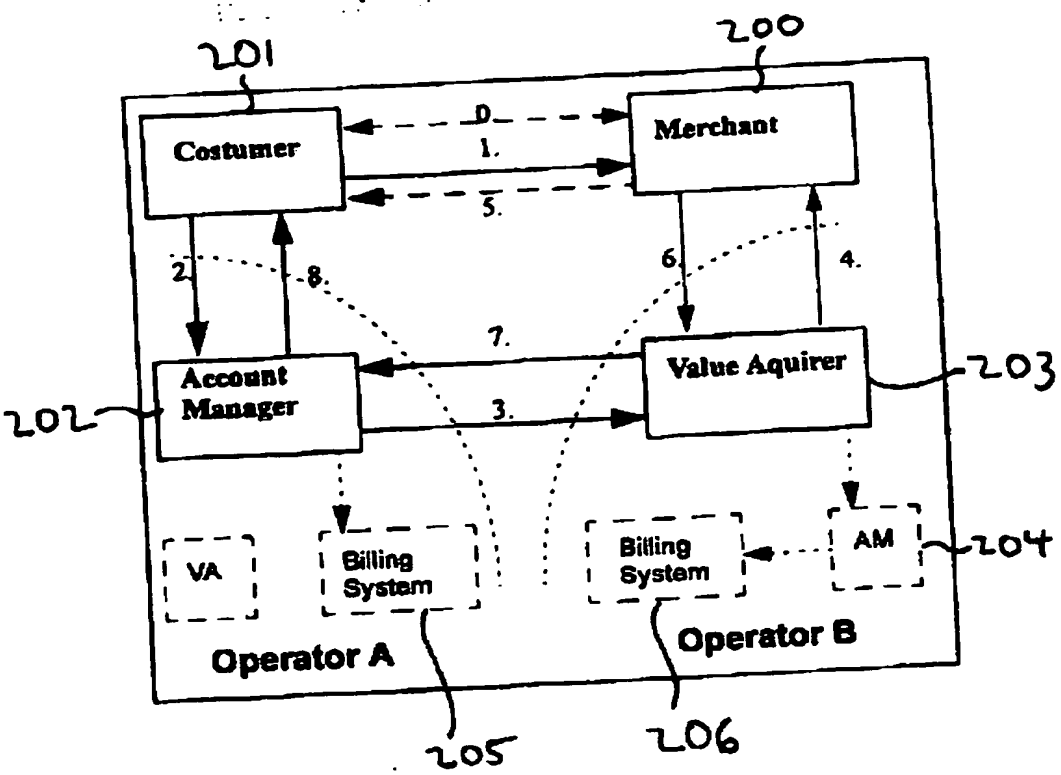
201
200
Costumer
Merchant
0
1.
5.
2
8.
6
4.
7.
Account Manager
Value Aquirer
203
202
3.
VA
Billing System
Billing System
AM
204
Operator A
Operator B
205
206

FIG 2

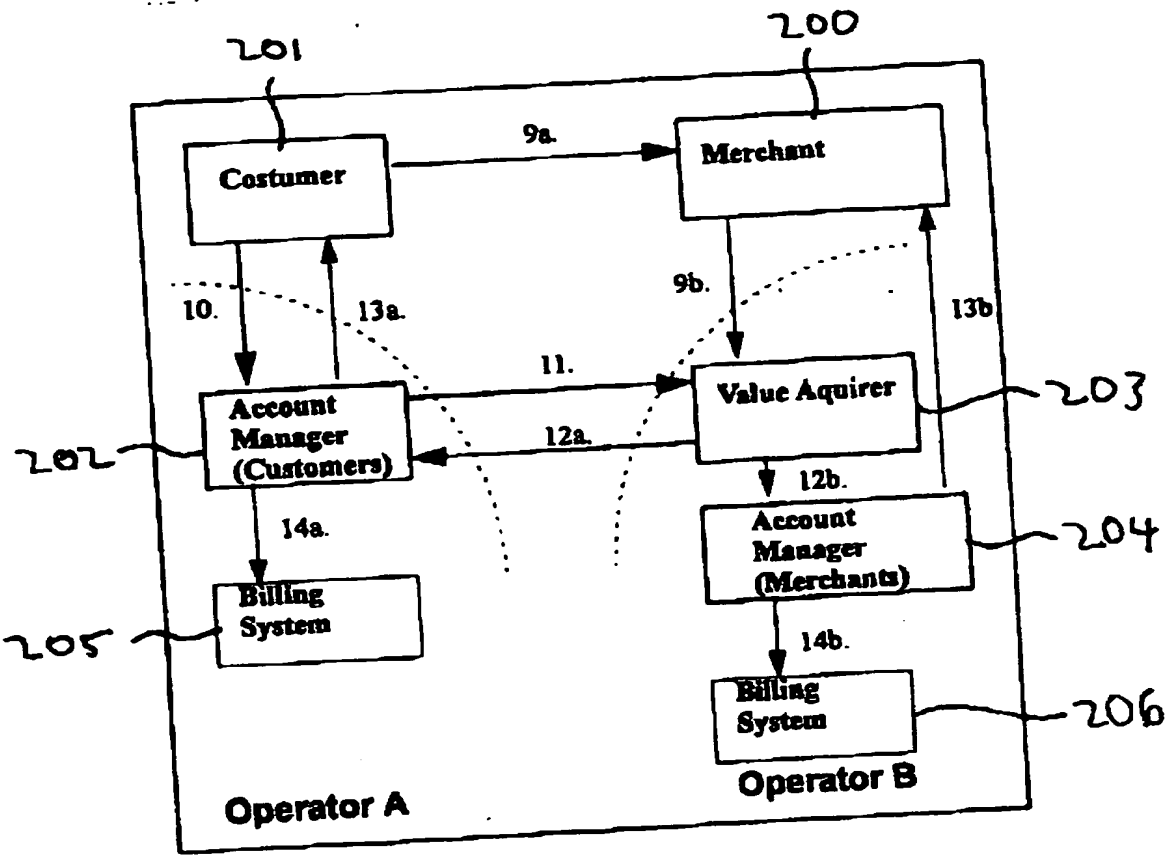
201
200
Costumer
9a.
Merchant
10.
13a.
9b.
13b
11.
Value Aquirer
203
Account Manager (Customers)
202
12a.
12b.
Account Manager (Merchants)
204
14a.
Billing System
205
14b.
Billing System
206
Operator A
Operator B

FIG 3